MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2300
Gaithersburg, Maryland 20899-2300

SRM Number: 1052b
MSDS Number: 1052b
SRM Name: Bis(1-phenyl-1,3-butanediono)-oxovanadium(IV)

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Description: This Standard Reference Material (SRM) is primarily intended for use in preparing standard oil solutions containing vanadium. It is essentially free from other metals and has suitable solubility, compatibility, and uniformity for use with most lubricating oils. Each unit consists of 5 g.

Substance: Bis(1-phenyl-1,3-butanedione)oxovanadium(IV)

Other Designations: Vanadium,oxobis(1-phenyl-1,3-butanedionato-o,o')

2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Component:	Bis(1-phenyl-1,3-butanedione)oxovanadium(IV)
CAS Number:	14767-37-4
EC Number (EINECS):	238-832-3
Nominal Mass Fraction (%):	100
EC Classification:	Xn (Harmful); not classified in Annex I of Directive 67/548EEC
EC Risk:	R22 (harmful if swallowed) R36/37/38 (irritating to eyes, respiratory system, and skin)
EC Safety:	S24/25 (avoid contact with skin and eyes) S45 (in case of accident or illness, see doctor; show label)

3. HAZARDS IDENTIFICATION

NFPA Ratings (Scale 0-4): Health = 1 Fire = 0 Reactivity = 0

Major Health Hazards: Vanadium compounds can cause eye irritation, asthma-like symptoms, GI upset, and other serious effects. The toxicological properties of this specific vanadium compound have not been fully evaluated.

Physical Hazards: Container may break.

Potential Health Effects

Inhalation: This material can irritate the nose, throat, and upper respiratory tract. Effects may include nosebleed, headache, tremors, dizziness, or bronchitis. Vanadium can cause an allergic reaction, with asthma-like symptoms that recur or become worse with each exposure. Prolonged or high-level exposure to vanadium can cause greenish-black discoloration of the tongue.

Skin Contact: Contact with vanadium or its compounds can cause skin irritation. Prolonged or repeated exposure may cause dermatitis.

Eye Contact: Vanadium dust can cause severe eye irritation with profuse tearing and burning sensation.

Ingestion: Ingestion of vanadium may cause abdominal pain, nausea, and vomiting. In laboratory animals, prolonged or repeated exposure to vanadium has caused kidney and liver damage, anemia, convulsions, and death, but these effects are unlikely in humans at workplace exposure levels.

Medical Conditions Aggravated by Exposure: This material may aggravate asthma, emphysema, dermatitis, conjunctivitis, or other pre-existing disorders affecting the target organs. Persons who take dietary supplements containing high levels of zinc may be more susceptible than others to the toxic effects of vanadium.

Listed as a Carcinogen/ Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

4. First Aid Measures

Inhalation: Move the person to fresh air immediately. If not breathing, qualified personnel may start CPR or give oxygen if necessary. Get medical aid at once, and bring the container or label.

Skin Contact: Remove contaminated clothing and shoes. Flush affected skin with water for at least 15 minutes, then wash thoroughly with soap and water. If skin irritation persists, get medical aid and bring the container or label. Wash contaminated clothing before reusing.

Eye Contact: Remove contact lenses (if any). Do not allow victim to rub eyes or keep eyes closed. Flush eyes with large amounts of running water for at least 30 minutes, keeping eyelids open and raising lids to remove all chemical. Get medical aid at once, and bring the container or label.

Ingestion: Contact a poison control center immediately for instructions. Wash out mouth with water, but do not induce vomiting. Get medical aid at once, and bring the container or label.

5. Fire Fighting Measures

Fire and Explosion Hazards: This material is not believed to be a significant fire or explosion hazard, but dust-air mixtures may ignite or explode. See also “Section 10”, Incompatible Materials.

Extinguishing Media: Use extinguishing media appropriate to the surrounding fire: water spray, dry chemical, carbon dioxide, or foam. Use a water spray to cool containers.

Fire Fighting: Avoid inhalation of material or combustion byproducts. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

Flash Point (°C): N/A

Autoignition (°C): N/A

Lower Explosive Limit (LEL): N/A

Upper Explosive Limit (UEL): N/A

Flammability Class (OSHA): N/A

6. Accidental Release Measures

Occupational Release: Isolate the spill area and remove any sources of ignition. Cleanup personnel must wear personal protective equipment ("Section 8"). Sweep up material and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

Disposal: Refer to "Section 13", Disposal Considerations.

7. Handling and Storage

Storage: Store this material in the original container at room temperature. Protect from moisture, heat, and physical damage, and isolate from incompatible materials.

Safe Handling Precautions: Wear a dust mask or respirator. Avoid contact or wash after handling.

8. Exposure Controls and Personal Protection

Exposure Limits: None listed.

Ventilation: Use local or general exhaust to keep employee exposures below limits. Local exhaust ventilation is preferred because it can control contaminant emissions at the source, preventing dispersion into the general work area. Refer to the ACGIH document *Industrial Ventilation, a Manual of Recommended Practices*.

Respirator: If necessary, refer to the NIOSH document *Guide to the Selection and Use of Particulate Respirators Certified under 42 CFR 84* for selection and use of respirators certified by NIOSH.

Eye Protection: Use chemical safety goggles where dusting or splashing of solutions may occur. See OSHA standard (29 CFR 1910.133) or European Standard EN166. The employer should provide an emergency eye wash fountain and safety shower in the immediate work area.

Personal Protection: Wear appropriate gloves and protective clothing to prevent contact with skin.

9. Physical and Chemical Properties

Component: Bis(1-phenyl-1,3-butanedione)oxovanadium(IV)

Appearance and Odor: Shiny green crystals, odorless

Relative Molecular Weight: 389.3

Molecular Formula: $C_{20}H_{18}O_5V$

Density (g/cm^3): > 1

Solvent Solubility: N/A

Water Solubility: Negligible

Melting Point (°C): 218 (425 ºF)

Vapor Pressure (Pa): Negligible

Vapor Density (Air = 1): 13.5

10. STABILITY AND REACTIVITY

Stability: __X__ Stable _____Unstable

Stable at normal temperature and pressure.

Conditions to Avoid: Dust generation; incompatible materials.

Incompatible Materials: Strong oxidizers.

Fire/Explosion Information: See "Section 5".

Hazardous Decomposition: Thermal decomposition of this material may produce carbon oxides (CO, CO_2) and toxic vanadium oxides.

Hazardous Polymerization: _____ Will Occur __X__ Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry: __X__ Inhalation __X__ Skin __X__ Ingestion

Toxicity Data: No toxicity data are available for this vanadium compound.

Target Organ(s): Respiratory tract, skin, eyes, immune system (allergic reaction).

Mutagen/Teratogen: The toxicity of this material has not been fully investigated. Some vanadium compounds may cause mutations. Dietary vanadium appears to suppress egg production in domestic chickens.

Health Effects: See "Section 3".

12. ECOLOGICAL INFORMATION

Ecotoxicity Data: No data available.

Environmental Summary: This material may be toxic to aquatic organisms. Do not release to the environment.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose of container and unused contents in accordance with federal, state, and local requirements, which vary according to location.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: Not regulated.

15. REGULATORY INFORMATION

U.S. REGULATIONS

CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated.

SARA Title III Section 302: Not regulated.

SARA Title III Section 304: Not regulated.

SARA Title III Section 313: Not regulated.

OSHA Process Safety (29 CFR 1910.119): Not regulated.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE:	Yes
CHRONIC:	Yes
FIRE:	No
REACTIVE:	No
SUDDEN RELEASE:	No

STATE REGULATIONS

California Proposition 65: Not regulated.

CANADIAN REGULATIONS

WHMIS Classification: Not available.

EUROPEAN REGULATIONS

EU/EC Classification: Xn (Harmful); not classified in Annex I of Directive 67/548EEC.

NATIONAL INVENTORY STATUS

U.S. Inventory (TSCA): Listed.

TSCA 12(b), Export Notification: Not listed.

16. OTHER INFORMATION

Sources:

Hazardous Substances Data Bank (HSDB): Vanadium Compounds.

IUCLID Chemical Data Sheet: Vanadium. European Chemicals Bureau, 19 February 2000.

New Jersey Department of Health, Hazardous Substance Fact Sheet, January 2001.

U.S. National Institute for Occupational Safety and Health, *NIOSH Pocket Guide to Chemical Hazards*, September 2005 edition. DHHS (NIOSH) Publication No. 2005-151.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use as a guide in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.